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^{52}Mn – a new PET tracer for imaging neural pathways

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Aims

We aimed at imaging neural pathways with ^{52}Mn PET in rats and testing potential toxicity of the tracer to the dopaminergic neurons.

Methods

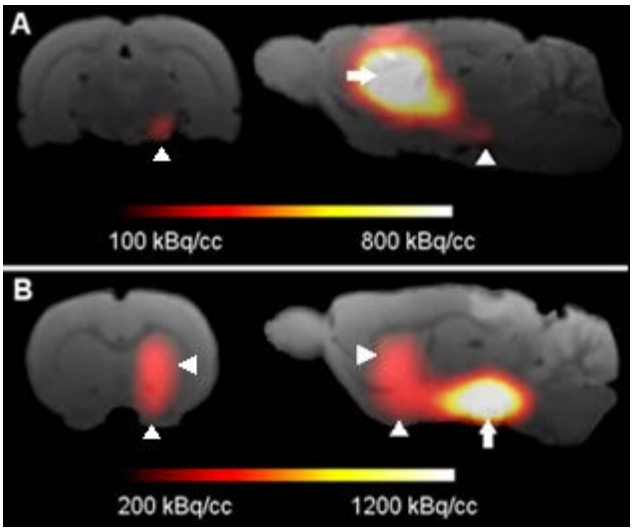
^{52}Mn was produced by proton irradiation of ^{nat}Cr and different purification methods were used in two experiments. In Experiment I 170kBq was injected to the right STR or VTA (n=8), in Experiment II – 20kBq to the VTA (n=18). PET was performed at 24h and the rotameter test at 3, 14 or 28 days post-injection. The brain tissue was used for TH- or γH2AX-staining.

Results

^{52}Mn transport along the direct and indirect striatonigral pathways could be seen after injection to the STR. In the "VTA group" the mesolimbic and nigrostriatal tracts were clearly delineated.

Purification method I resulted in higher metal contamination than method II.

In Experiment I, an increased ipsilateral vs contralateral rotation was observed in some animals. This corresponded to the dopaminergic lesion detected by the TH-staining. In contrary, no behavioral effect or dopaminergic damage was found in Experiment II. There was also no difference between the ^{52}Mn-injected and control brain tissues in the γH2AX-staining.



PET was performed 24h after ^{52}Mn injection to the STR (**A**) or VTA (**B**). The arrows point at the injection location and the arrowheads at the regions to which the tracer was transported: SN in **A**, NAc and STR in **B**.

Conclusions

^{52}Mn traces neural pathways allowing their imaging with PET. The optimized experimental protocol prevents lesioning dopaminergic neurons and affecting the rotation behavior up to 4 weeks post-injection.